Senior 1 Mathematics
Standards Test

Administration Information for Supervising Teachers

June 2005

Manitoba
Building for the Future

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Preface

As announced in the May 2004 letter regarding Provincial Assessment and Standards Testing Schedule <www.edu.gov.mb.ca/ks4/assess/testingdates_2004-2005.pdf> Manitoba Education, Citizenship and Youth is in the process of phasing out standards tests at the Grade 6 and Senior 1 levels. This year the Senior 1 Mathematics Standards Test is available for classroom use. It was developed in collaboration with teachers from across the province and is based on the *Senior 1 Mathematics: Manitoba Curriculum Framework of Outcomes and Senior 1 Standards* (1997).

All schools have been provided with one copy of this test. Schools are responsible for photocopying all necessary materials required for the administration of the test. The responsibility for marking these tests lies solely with the schools or divisions who wish to administer the test; the department will not be providing financial support.

This "Administration Information" booklet has been compiled to provide support to those teachers who wish to administer the Senior 1 Mathematics Standards Test in the manner intended. The guidelines in this booklet should be observed to ensure the consistency of the test administration and comparability if wishing to analyse results over time or across schools.

Should you have any questions about the administration or the marking of this test please contact Ken Horton, Assessment Consultant, at 945-2576 or toll-free at 1 800 282-8069, extension 2576.

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General Information

Features of the test

Please be aware of the following features of the Senior 1 Mathematics Standards Test—June 2005:

- the test is designed to be administered in one session of 2 hours with an additional 30 minutes if requested by the student and at the discretion of the classroom teacher;
- the two curricular choices, Choice I and Choice II, will be contained in the same test booklet;
- the test will contain both selected-response and constructed-response items;
- among the constructed-response items, the test will include "open-response" items which will be scored according to the Standards-Based General Scoring Rubrics (4-mark and 6-mark) found in the *Marking Guide*;
- English or French versions of the test will be available for students enrolled in Senior 1 Mathematics and "Mathématiques de secondaire 1"; and
- the test is designed to assess student achievement relative to end-of-semester learning outcomes, and so is intended to be administered near the end of the semester.

Test schedule

The following table summarizes the schedule for the Senior 1 Mathematics Standards Test:

Preparation Time	Time Required for Test
15 minutes preparation and instructions	2 hours + 30 minutes (optional)

The total writing time for each session is 120 minutes plus 15 minutes for preparation and instructions. Additional writing time of 30 minutes is permissible if needed.

Student materials

Students may use the following materials during the Senior 1 Mathematics Standards Test:

- scientific calculators;
- HB pencils;
- manipulative materials, such as algebra tiles, cubes and tracing paper;
- geometry sets;
- rulers; and
- erasers.

Students are not permitted to exchange materials during the test.

The following materials should **not** be used during the test:

- classroom notes, classroom textbooks, and other such materials;
- subject-related materials on display;
- dictionaries or translation resources of any kind; and
- graphing calculators.

Students leaving the room

Students should be expected to remain in the room for a minimum of 60 minutes from the start of the test or the entire session.

However, any student who must leave and re-enter the room should be accompanied by a replacement supervisor. This practice ensures that the supervising teacher can remain in the test room with the students at all times.

Late arrivals

To avoid the opportunity for student discussion of test questions during the administration of the test, students may not enter the test room after the first hour of writing.

Students, who arrive late, but within the first hour of the test, may be allowed additional time corresponding to the amount by which the student was late.

Responding to student questions

Avoid making any directing/guiding comments during the test, other than those required for distribution of materials and instructions to students.

No explanations, translations, rephrasing, clarifying statements or comments of a similar nature may be provided about the test content. Supervising teachers can, however, provide clarification regarding test taking rules or procedures.

If a student asks a question related to test content, a suggested response is, "I'm sorry. I can't answer your question. Do your best with it."

Please contact Ken Horton, Assessment Consultant, at 945-2576 or toll-free at 1 800 282-8069, extension 2576 to report any suspected errors in printing or wording prior to any discussion with students.

Violation of rules

The *Standards Test Session Rules* are read aloud to students by the supervising teacher immediately before the test (see Appendix 1, p. 7). Should a violation of rules occur, the student is permitted to complete the test. The consequences of a violation of rules are a local decision. Note, however, that cheating and plagiarism result in a standards test mark of 0%.

Responsibilities of Supervising Teachers

Supervising teachers administer the test using the step-by-step procedures outlined in the following section.

Advance preparations
• Ensure that all subject-related materials have been removed from the walls and boards.
• Ensure that a replacement supervisor is available to accompany students who must temporarily leave the room during the test.
• Notify students in advance of the:
– time, location and duration of each test session;
– materials needed to write the test;
– *Standards Test Session Rules* (see Appendix 1, page 7);
– list of *Directing Words* (see Appendix 2, page 8); and
– requirement to remain in the test room for the initial 60 minutes.
• Students may not bring anything produced outside of class into the test session.
• Ensure that you have extra supplies and that there is a functioning pencil sharpener and stapler in the room. Students must not exchange materials during the test.

Prior to test session
• Ensure that you have access to the following test materials:
– *Student Response Booklets*;
– extra copies of test booklets; and
– *Administration Information for Supervising Teachers* (this document).
• Arrange the desks so they are spaced as far apart as possible.
• Make arrangements per school policy to ensure that students who are exempted from writing the test are accommodated in an alternate setting.

Beginning the test session
• Distribute *Student Response Booklets*.
• Read aloud *Standards Test Session Rules* to students (Appendix 1, page 7).
• Read aloud the *Points to Remember* to students (page *iii* in the test booklet, and reproduced in Appendix 3, page 9 in this document).
• Remind students to:
– pace themselves in writing the test; and
– check over their work to ensure that all questions have been attempted.
• Tell students to complete common items and Choice I ***OR*** common items and Choice II.

During the test session
• Remain in the classroom throughout the entire test session.
• Half-way through the test session, advise students of the amount of time remaining by writing it on a board.

Ending the test session
• Collect test booklets from each student ensuring that each booklet has the necessary student identification.

Appendices

Appendix 1: Standards Test Session Rules

The supervising teacher should read these rules aloud to students at the beginning of the Senior 1 Mathematics Standards Test:

- During the test session, do not proceed until instructed to do so.
- If you notice that your test booklet is damaged or improperly printed, please raise your hand, and I will give you another test booklet.
- You are expected to remain in the test room for one hour.
- To write the test you should only have a scientific calculator, a HB pencil, a geometry set, a ruler, and an eraser. You may also have manipulative materials. No other materials are permitted. Do not exchange test materials. A formula page is provided.
- You may not help another student. You should not get help from another student. If you need anything during the test, raise your hand and I will come to you.
- During the test I can help you with the directions, but I will not be able to help you with the test questions.
- When I ask you to stop writing, put your pencil down immediately.
- You may not throw away any materials. Any extra paper used must be stapled in your test booklet. You may **not** leave the room with any test materials.

If you do not understand any of these rules, raise your hand and I will explain them again.

Appendix 2: Directing Words

Students should be prepared to answer questions containing the following directing words:

The word	The question is asking for...
create	an idea or object that you have made up
justify/support/verify	an explanation, information or evidence that shows why your method, idea or answer is good
explain	words or symbols, diagrams, charts or graphs, or other methods that **make clear** what you mean or what you are thinking
illustrate/sketch	a reasonably neat picture or diagram (not necessarily to scale) that shows or explains an idea or method
model	a sketch that shows an idea; a type of explanation
assumption	anything or any condition that is not given in the question but that you have supposed or invented to find the answer to the problem
generalisation	a general idea, statement, rule or principle that relates an answer or conclusion to other similar situations

Appendix 3: Points to Remember

Formulas are given on the **"Formulas"** page in the *Student Response Booklet* (page iii) or with the question when needed.

Diagrams are not drawn to scale unless indicated otherwise.

The total time allowed for writing the test is 150 minutes (120 minutes plus 30 minutes extra time, which your teacher may allow if you need it).

- Work alone on this test.
- You may use a scientific calculator. All other electronic aids are not allowed.
- You may use models or other manipulative materials, including tracing paper.
- Notes, notebooks or textbooks may not be used during the test.
- You may use blank scrap paper but it must be handed in at the end of the test. You may do rough work anywhere in this booklet.

If you need more space to answer a question, you may use an extra page provided by your teacher. Write your name or Booklet ID number and question number on any extra page(s) used. Staple the page(s) into your booklet where your answer begins.

Student identification:

SENIOR 1
MATHEMATICS
TEST

Student Response Booklet
Choice I and Choice II

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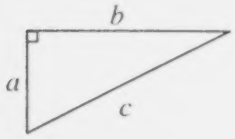
SENIOR 1 MATHEMATICS

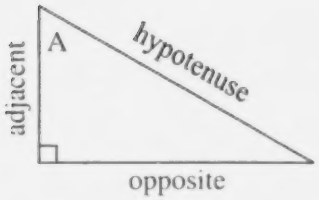
FORMULAS

Pythagorean Theorem



$a^2 + b^2 = c^2$

Trigonometric Ratios

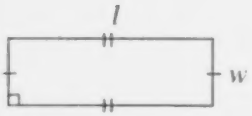


$$\sin A = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos A = \frac{\text{adjacent}}{\text{hypotenuse}}$$

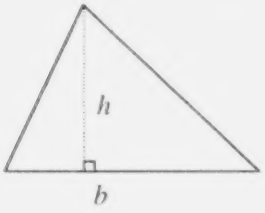
$$\tan A = \frac{\text{opposite}}{\text{adjacent}}$$

rectangle



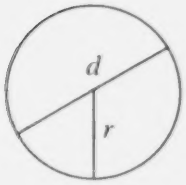
$A = lw$
$P = 2l + 2w$

triangle

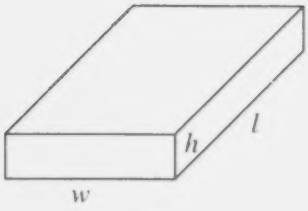


$A = \frac{bh}{2}$

circle



$A = \pi r^2$
$C = 2\pi r \quad C = \pi d$



Volume = lwh

Surface Area = Total area of all faces of a 3-D object.

SENIOR 1 MATHEMATICS

POINTS TO REMEMBER

Formulas are given on the **"Formulas"** page on the other side of this page or with the question when needed.

Diagrams are not drawn to scale unless indicated otherwise.

The total time allowed for writing the test is 150 minutes (120 minutes plus 30 minutes extra time which your teacher may allow if you need it).

- Work alone on this test.
- You may use a scientific calculator. All other electronic aids are not allowed.
- You may use models or other manipulative materials, including tracing paper.
- Notes, notebooks or textbooks may not be used during the test.
- You may use blank scrap paper but it must be handed in at the end of the test. You may do rough work anywhere in this booklet.

If you need more space to answer a question, you may use an extra page provided by your teacher. Write your name or Booklet ID number and question number on any extra page(s) used. Staple the page(s) into your booklet where your answer begins.

DESCRIPTION—COMMON ITEMS AND CHOICE I (Spatial Geometry)

Total possible marks: 70 **Time: 120 minutes**

This test consists of 2 parts:

Part	Description	Suggested Time (minutes)	Marks
A	*Selected-response questions*: worth one mark each.	40	26
B	*Constructed-response questions*: mark value is indicated for each question.	80	44

DESCRIPTION—COMMON ITEMS AND CHOICE II (Transformational Geometry)

Total possible marks: 70 **Time: 120 minutes**

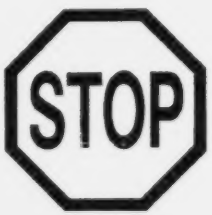
This test consists of 2 parts:

Part	Description	Suggested Time (minutes)	Marks
A	*Selected-response questions*: worth one mark each.	40	26
B	*Constructed-response questions*: mark value is indicated for each question.	80	44

DIRECTIONS FOR PART A: SELECTED-RESPONSE QUESTIONS

(Suggested Time: 40 minutes)

- Read each question carefully.
- Choose the best response.
- Each question should take no more than about two minutes to answer. If a question is taking too long to answer, come back to it later.



PLEASE WAIT UNTIL THE TEACHER TELLS YOU TO TURN THE PAGE.

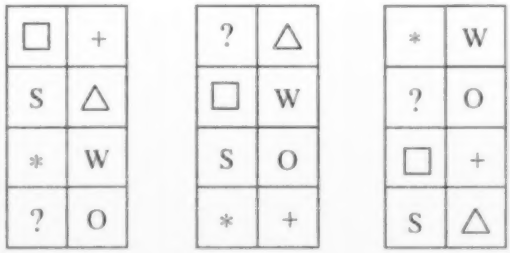
PART A

SELECTED-RESPONSE QUESTIONS

1. Bob has forgotten his password which contains each of the letters X, O, G, and B. What is the maximum number of different 4-letter combinations that Bob has to check to find the right password?

A) 10 B) 16 C) 24 D) 32

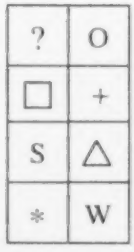
2. In the following pattern, what is the next picture?



A)

B)

C)

D) 

3. A corner store sells six different flavours of ice cream. How many combinations of double scoop ice cream cones of two different flavours are possible?

A) 12 B) 15 C) 21 D) 36

4. If Tom's father is Jerry's son, then Jerry is Tom's

A) grandfather. B) father. C) son. D) grandson.

5. A salesperson for Clean-All soap uses the following statements to attract customers. Which statement most directly relates to the quality of the soap?

A) Clean-All is available in money-saving supersize.

B) 9 out of 10 customers surveyed would use Clean-All again.

C) Sales of Clean-All have increased 100% in the last year.

D) Clean-All removes more grease than most leading brands.

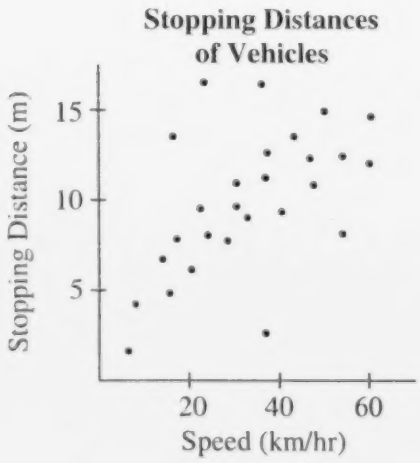
6. What type of relationship does this scatterplot show?

A) no relationship

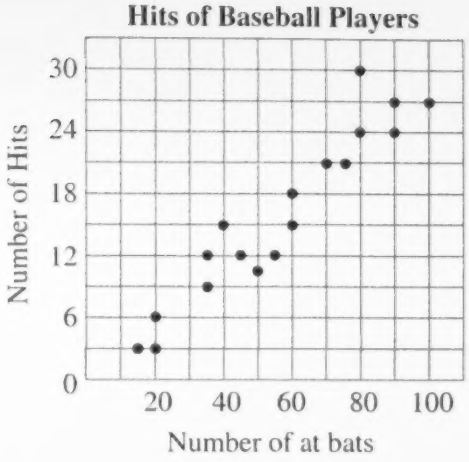
B) outlier

C) positive correlation

D) negative correlation



7. The following data were collected during a baseball season and plotted on a graph:



Based on the data in the graph, the **best** estimate would be:

A) with 50 at bats, there will be 9 hits.

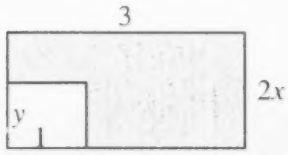
B) with 85 at bats, there will be 25 hits.

C) with 20 at bats, there will be 12 hits.

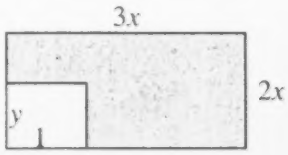
D) with 60 at bats, there will be 10 hits.

8. Which figure has a shaded region with an area of $6x - y$?

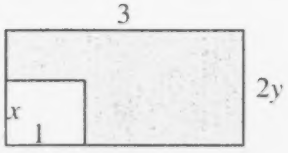
A)



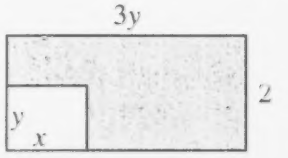
B)



C)



D)



9. The product of $7x(x + 2y - 6)$ is equal to

A) $7x^2 + 2y - 6$

B) $7x^2 + 14xy - 42$

C) $7x^2 + 14xy + 42x$

D) $7x^2 + 14xy - 42x$

10 Which of the following equations is equivalent to $6x^2 + 2x = 12$?

A $2[3x^2 + 1] = 12$

B $3x^2 + 2x = 6$

C $3x^2 + x = 6$

D $(6x + 2x) = 12$

11 Solve $2x - 4 = 4x + 10$.

A $x = -3$ B $x = -1$ C $x = 1$ D $x = 3$

12 At a music store, Sam bought 1 CD, Kris bought 1 CD and Sally bought 3 CDs.
All of the CDs were the same price but Kris had a coupon that gave her $2.00 off.
In total, they spent $50 at the store.
How much did Sam pay for his CD?

A $8.40 B $9.60 C $10.00 D $10.40

13 Jamie rolls a 6-sided number cube and gets a 5 three times in a row.
The probability of getting a 5 on the **next roll** is

A $\frac{1}{1296}$ B $\frac{1}{216}$ C $\frac{1}{36}$ D $\frac{1}{6}$

10. Which of the following equations is equivalent to $6x^2 + 2x = 12$?

A) $2(3x^2 + 1) = 12$

B) $3x^2 + 2x = 6$

C) $3x^2 + x = 6$

D) $x(6x + 2x) = 12$

11. Solve: $2x = 4x - (x + 3)$.

A) $x = -3$ B) $x = -1$ C) $x = 1$ D) $x = 3$

12. At a music store, Sam bought 1 CD, Kris bought 1 CD, and Sally bought 3 CDs.
All of the CDs were the same price but Kris had a coupon that gave her \$2.00 off.
In total, they spent \$50 at the store.
How much did Sam pay for his CD?

A) \$8.40 B) \$9.60 C) \$10.00 D) \$10.40

13. Jamie rolls a 6-sided number cube and gets '5' three times in a row.
The probability of getting a '5' on the **next roll** is

A) $\frac{1}{1296}$ B) $\frac{1}{216}$ C) $\frac{1}{36}$ D) $\frac{1}{6}$

14. From the menu, a customer chooses one entrée, one drink and one dessert. What is the probability that the meal is a hamburger with milk and then cake?

A) $\frac{1}{36}$

B) $\frac{1}{24}$

C) $\frac{3}{10}$

D) $\frac{11}{12}$

MENU

ENTRÉE
Chicken salad
Hamburger
Vegetable stir-fry

DRINK
Apple juice
Milk
Tea

DESSERT
Ice cream
Cake
Chocolate pudding
Cookie

15. Which expression has a numerical coefficient of $-\frac{1}{2}$?

A) $-\frac{x^3}{2}$ B) $\frac{(-x)^2}{2}$ C) $-\frac{1}{x^2}$ D) $\frac{x^{-2}}{2}$

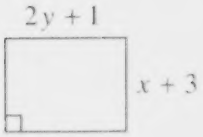
16. Which expression has the same value as $\frac{2^4}{9^2}$?

A) $\frac{4}{9}$ B) $\frac{4^2}{3^4}$ C) $\frac{8}{81}$ D) $\left(\frac{2^2}{9^2}\right)^2$

17. The quotient of $\frac{x^6 - x^4}{x^2}$ is equal to

A) x^0 B) $x^4 - x^2$ C) $x^3 - x^2$ D) x^2

18. The expression for the **area** of the rectangle is



A) $2xy + x + 5y + 4$

B) $2xy + 3$

C) $2x + 4y + 8$

D) $2xy + x + 6y + 3$

19. If $x = -2$ and $y = -1$, evaluate $-2x^4 - 3y^3$

A) −35 B) −29 C) 35 D) 283

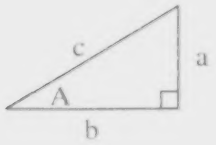
20. Which expression is equivalent to $\left[\left(x^a\right)^b\right]^c$?

A) x^{abc} B) $x^{ab + c}$ C) $x^{a + b + c}$ D) x^{3abc}

21. The length (x) of the sides of a square is found from the formula $x^2 = 50$.
The length of one side of the square is about:

A) -7.07 B) 7.07 C) 12.5 D) 25

22. In words, $\cos A$ is



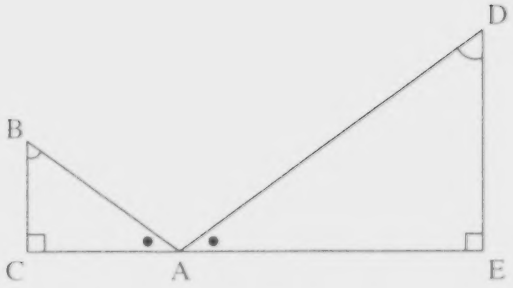
A) the ratio of side a to side c.

B) the measure of angle A.

C) the ratio of side b to side c.

D) the length of the adjacent side.

23. ΔABC is similar to ΔADE.
Therefore, $\sin \angle B$ is equal to



A) $\cos \angle D$

B) $\frac{AE}{AD}$

C) $\sin \angle A$

D) $\frac{BC}{AB}$

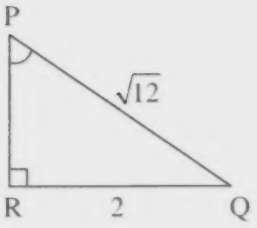
24. The measure of angle P is about:

A) 19°

B) 30°

C) 35°

D) 55°

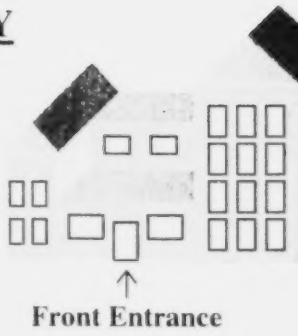


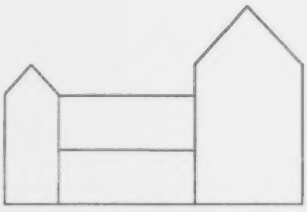
(Diagram not to scale)

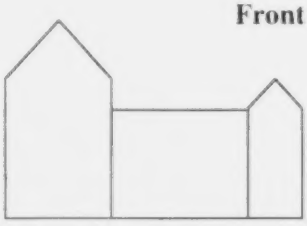
Complete Choice I on page 9
***OR* Choice II on page 11.**

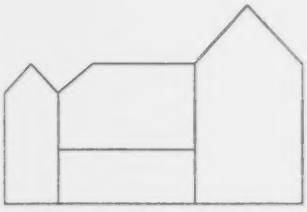
CHOICE I: SPATIAL GEOMETRY

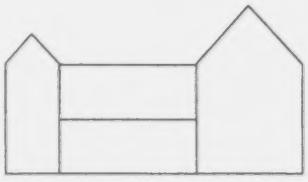
25. Which of the following represents the front elevation of the building?



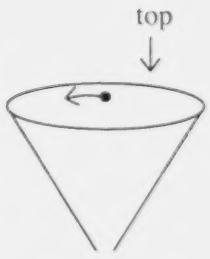
A) 

B) 

C) 

D) 

26. A marble rolls around in a glass cone until it reaches the bottom. Using the **top view**, the locus of points for the marble is



A)

B)

C)

D)

End of Choice I Selected-Response Questions.

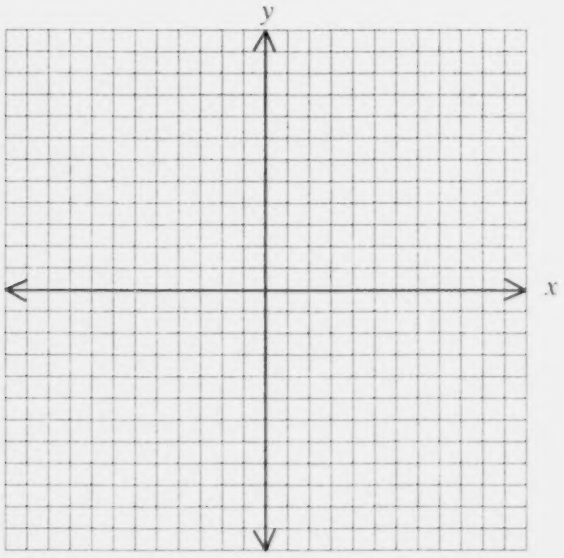
Now go to Part B: Constructed-Response Questions on page 13.

(blank page)

CHOICE II: TRANSFORMATIONAL GEOMETRY

25. If point $P(3, 12)$ of a figure has been rotated $90°$ clockwise about the origin, the coordinates of its image are

A) $P'(-12, 3)$ B) $P'(-3, -12)$ C) $P'(12, 3)$ D) $P'(12, -3)$



26. Triangle ABC is reflected and produces the image $A'B'C'$. The two triangles **must** be congruent because

A) they have the identical size and shape.

B) they have congruent angles.

C) one is a transformation of the other.

D) the ratios of the corresponding sides are equal.

End of Choice II Selected-Response Questions.

Now go to Part B: Constructed-Response Questions on page 13.

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DIRECTIONS FOR PART B: CONSTRUCTED-RESPONSE QUESTIONS

(Suggested Time: 80 minutes)

Write your answers in the space provided with each question. If you need more space to answer a question, you may use an extra page provided by your teacher. Write your Booklet ID number and question number on any extra page(s) used. Staple the page(s) into your booklet where your answer begins.

Directing Words

Some questions may include directing words such as *explain*, *justify* and *create*. These words are explained below.

The word	The question is asking for...
create	an idea or object that you have made up
justify/support/verify	an explanation, information or evidence that shows why your method, idea or answer is good
explain	words or symbols, diagrams, charts or graphs, or other methods that **make clear** what you mean or what you are thinking
illustrate/sketch	a reasonably neat picture or diagram (not necessarily to scale) that shows or explains an idea or method
model	a sketch that shows an idea; a type of explanation
assumption	anything or any condition that is not given in the question but that you have supposed or invented to find the answer to the problem
generalization	a general idea, statement, rule or principle that relates an answer or conclusion to other similar situations

Suggestions for answering OPEN-RESPONSE QUESTIONS:

- provide **complete answers**;
- let the mark values for each question guide you in answering it;
- provide good explanations and justifications; and
- use a systematic and well-organized method in communicating the answer.

DO NOT USE

PART B

CONSTRUCTED-RESPONSE QUESTIONS

27. Miguel wrote a sequence of equations. 101
Here is a section of it:

$$e + 4 = 3e$$
$$f + 6 = 3f$$
$$g + 8 = 3g$$
$$h + 10 = 3h$$
$$i + 12 = 3i \ldots$$

a) Continue the sequence of equations to complete the following:

$$m + ____ = ____$$

b) In the above equations, explain the **relationship between** the value of the variables and the constant terms.

2 marks

DO NOT USE

102

28. Gary is trying to give an idea of the winter temperatures in Manitoba to his friend in southern California. In order to convert the temperatures from Celsius (C) to Fahrenheit (F), he uses the following formula:

$$F = 1.8C + 32$$

a) Calculate the temperature in Fahrenheit (F) if $C = -30°$Celsius.

b) • Using the equation above, what is the equivalent of $5°F$ in Celsius (C)?
• Show your work.

3 marks

DO NOT USE

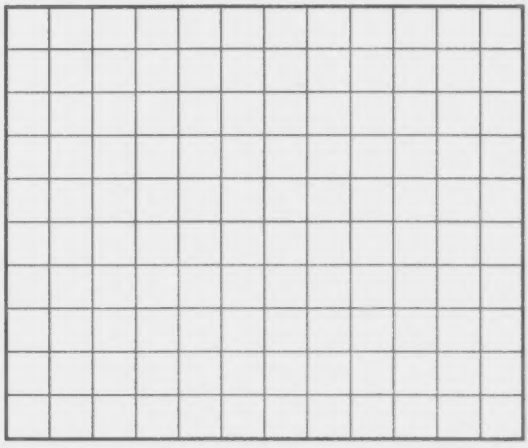
103

29. **OPEN-RESPONSE QUESTION**

A researcher wants to know if there is a relationship (or correlation) between how much time Canadian students sleep and how well they do in school. She collects the following data from a total of 15 boys and girls in a Manitoba Senior 1 classroom.

hours of sleep	6.0	6.5	8.0	9.0	8.5	8.0	9.5	8.5	8.0	7.0	6.5	7.5	5.5	7.0	6.0
average mark (%)	60	85	70	90	65	60	65	80	80	65	70	85	90	45	70

a) Make a scatterplot using the data. Include a title, labels and scales.



b) According to the data, what relationship (correlation) exists between the two variables?

c)
- State one possible bias in this study.
- Explain how the researcher could have avoided this bias.

6 marks

30. The perimeter of the trapezoid below is equal to the perimeter of the square.

Perimeter = $8y + 12$

a) Write the **simplified** algebraic expression for the length of one side of the square.

b) Write the **simplified** algebraic expression for the area of the square.
- Show your work.

3 marks

DO NOT USE

105

31. a) Solve this equation:

$$10p = 5(3p - 2)$$

- Verify your answer by substitution.

b) Jackson was asked to write an equivalent equation to the one given in a). He wrote:

$$20p = 10(6p - 4)$$

- Is Jackson's equation equivalent or not equivalent to the one in a)? Explain your thinking.

3 marks

DO NOT USE

106

32. You can use algebra to understand the following mathematical "trick".

a) Complete the following steps to see how the trick works.

	Steps		Simplified Algebraic Representation		Simplified Numerical Representation
1.	Pick a starting number	=	x		5
	↓		↓		↓
2.	Double the number	=	$2x$		10
	↓		↓		↓
3.	Add 12	=			
	↓		↓		↓
4.	Divide by 2	=			
	↓		↓		↓
5.	Subtract the starting number (step 1)	=	(End result)	=	(End result)

b) How can you change step 3 so the end result will always be -4?

3 marks

DO NOT USE

107

33. **OPEN-RESPONSE QUESTION**

Taxi Company A charges a flat fee of $4.00, plus $1.30 for each kilometre travelled.

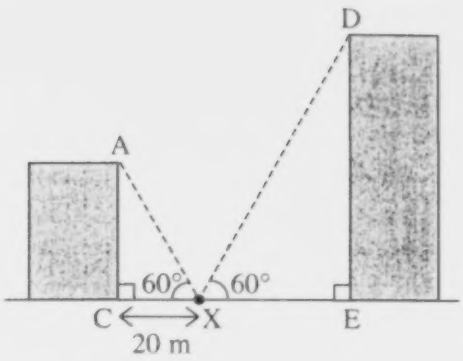
a) • Write an equation to show how much it costs to use Company A for a distance of "x" kilometres.
   • How much will it cost to take a taxi from Company A for 10 kms?

b) A new taxi company charges the same way (flat fee plus an amount for each kilometre) as Company A, but wants to be cheaper for trips under 10 kms and more expensive for longer trips.
   • How can the new taxi company charge its customer? Write an equation.
   • Justify your answer.

4 marks

DO NOT USE

34. From point X, the angles of elevation to the top of the two buildings are shown in the diagram.
Point X is 20 metres from the short building.



108

a) Use trigonometry, to determine the height of the shorter building.

b) State why these two triangles are **similar**.

c) Explain how to use **similar triangles** to calculate the height of the taller building.

3 marks

35. Jill has twelve candies in a bag: 5 red, 4 yellow, 3 green.

109

a) She randomly picks 2 candies. She records the colour of the first candy and then **returns** it to the bag before picking a second candy.
- What is the probability that both candies are green?
- Show your work.

b) What is the minimum number of candies Jill has to pick out and **eat** before being sure of picking a red one? Explain your reasoning.

3 marks

DO NOT USE

110

36. **OPEN-RESPONSE QUESTION**

Using 4 **different** exponent laws, create 4 expressions that are equivalent to x^6.

Expression 1	Expression 2	Expression 3	Expression 4

4 marks

111

37. a) Anita got this answer to a problem:

$$75.04 \times 10^6$$

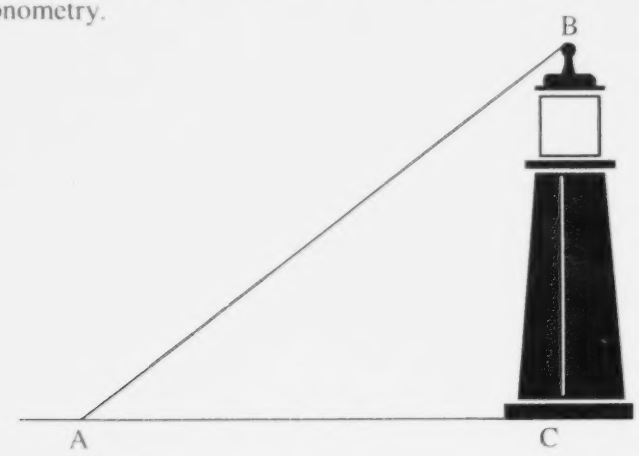
Write the answer in scientific notation.

b) Write the following expression in scientific notation.

$$\frac{\left(6.5 \times 10^{-5}\right) \times \left(3.9 \times 10^{4}\right)}{2.3 \times 10^{5}}$$

2 marks

38. Chris needs to measure the height of a lighthouse, and there is no way to get to the top of it. Chris decides to use trigonometry.



a) State or show what measurements Chris needs to make in order to use trigonometry to calculate the height of the lighthouse.

b) Which trigonometric ratio should Chris use to calculate the height of the lighthouse?

2 marks

Complete Choice I on pages 25 and 26
***OR* Choice II on pages 27 and 28.**

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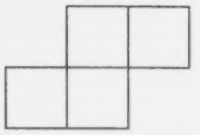
DO NOT USE

CHOICE I: SPATIAL GEOMETRY

113

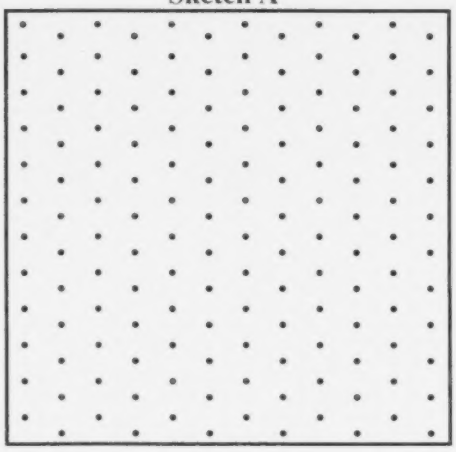
39. **OPEN-RESPONSE QUESTION**

a)
- Draw two different 3-dimensional models that contain 8 cubes and that have the front elevation shown.
- Label the front of each model.
- Shade the top.

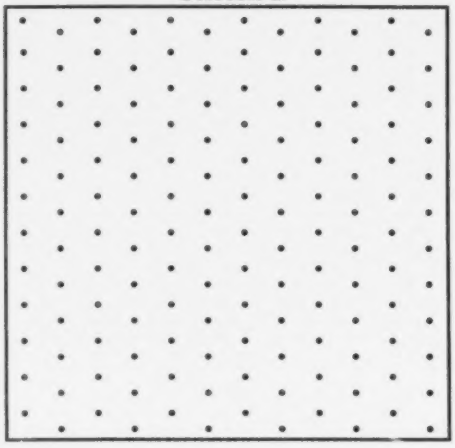


Front Elevation

Sketch A

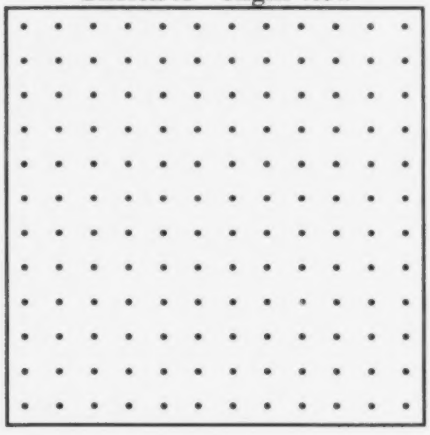


Sketch B

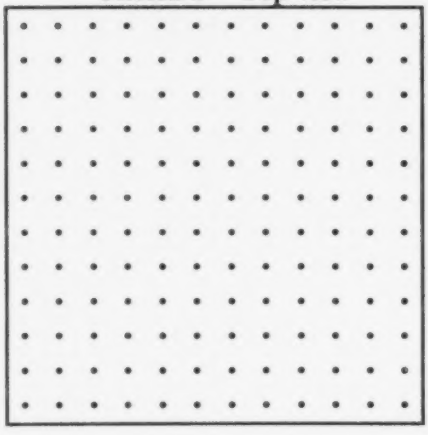


b) Draw the right view for Sketch A and the top view for Sketch B.

Sketch A – Right view



Sketch B – Top view

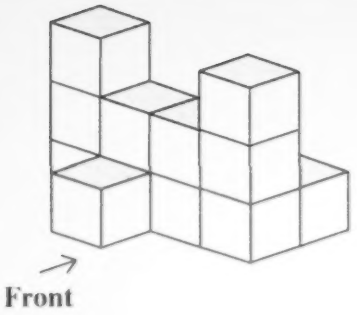


4 marks

DO NOT USE

114

40. Twelve cubes were used to build this object.
    - Sketch the **base plan** for the object shown.
    - Include the **number of cubes** in each column.



2 marks

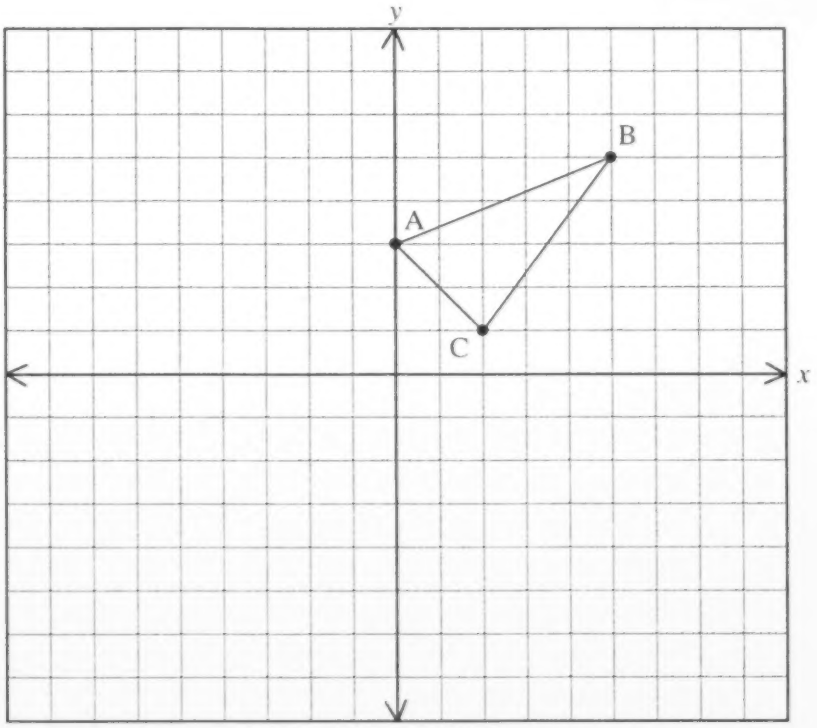
END OF TEST—CHOICE I

DO NOT USE

CHOICE II: TRANSFORMATIONAL GEOMETRY

113

39. a)
- Rotate ΔABC about the origin, 90° **counter-clockwise**, and draw its image.
- Label the image $\Delta A'B'C'$.



b) State the coordinates of the vertices of $\Delta A'B'C'$.

$A'(\quad,\quad)$

$B'(\quad,\quad)$

$C'(\quad,\quad)$

2 marks

DO NOT USE

114

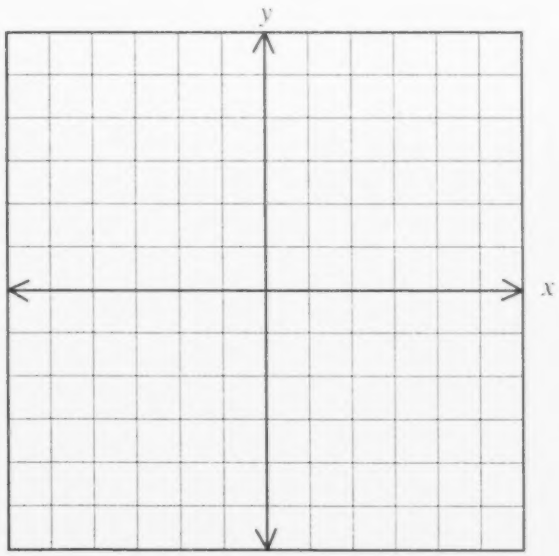
40. **OPEN-RESPONSE QUESTION**

A figure and its dilatation image are always similar.

a) What relationship exists between the corresponding sides of similar figures?

b) What relationship exists between the corresponding angles in similar figures?

c) Draw and label the dimensions (sides or angles) of a figure and its dilatation to support your answer in a) or b).



4 marks

END OF TEST—CHOICE II

SENIOR 1 MATHEMATICS TEST

Marking Guide
Choice I and Choice II

June 2005

Manitoba
Building for the Future

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Manitoba Education, Citizenship and Youth,
Instruction, Curriculum and Assessment Branch,
Winnipeg, Manitoba R3E 3J5

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General Marking Instructions

A. Scoring the Selected-Response Questions

Please follow the ***Answer Key for Selected-Response Questions*** on page 5 of this document.

B. Scoring the Constructed-Response Questions

The respective marking key or scoring rubric should be used in conjunction with the ***Senior 1 Mathematics: Manitoba Curriculum Framework of Outcomes and Senior 1 Standards*** when assigning scores to student responses.

B.1 Scoring Guidelines—Restricted-Response Questions (with or without Explanation)

Each question of this type is designed to elicit a well-defined response according to the associated specific outcome(s) and relevant mathematical processes. Their purpose is to determine whether a student meets the standards for the course (level 2) as they relate to the knowledge and skills associated with the question. **Scoring is in whole-mark intervals (there are no half-marks).**

To receive full marks, a student's response must be complete and correct. Partial marks may be awarded for a "relevant strategy" with execution errors. ***A relevant strategy is defined as one that is consistent with the specific outcome(s) and mathematical processes associated with the question that, if properly executed, would lead to the correct answer.*** Where alternative strategies are possible, the ***Marking Key*** makes mention of them

For some questions the *Marking Key* identifies errors that are "trivial". No marks are to be deducted for such errors. In order to be considered trivial, an error must be conceptually unrelated to the outcome(s) associated with the question and not lead to a mathematically incorrect answer. Such errors are distinct from minor errors (generally not conceptual in nature but leading to an incorrect answer) and major errors (an omission or error that is conceptual in nature).

B.2 Scoring Guidelines—Open-Response Questions

These questions are designed to elicit student responses at any of the three levels of achievement defined in *Senior 1 Mathematics: Manitoba Curriculum Framework of Outcomes and Senior 1 Standards*. The rubrics contain the language of the curricular standards in order to facilitate scoring in a manner that is consistent with those standards. The recommended procedure for scoring student responses is as follows:

1. Read the relevant specific outcome(s) in *Senior 1 Mathematics Framework of Manitoba Outcomes and Senior 1 Standards*.
2. Read the possible solution(s) provided in this document.
3. Study the student exemplars provided and the rationales for the assigned scores.
4. Carefully view all of the student's response and decide which of the three levels of achievement ("exceptional understanding", "good understanding" or "limited understanding") best applies. Whether the response clearly fits into one category or straddles two, this process will narrow down the number of possible scores that can be assigned to the response.
5. Compare the features of the student's response with the general performance indicators accompanying the mark values and the specific performance indicators (criteria) contained in the rubric. Note that the specific performance indicators only typify a student's response in a given score category. An exact match is not anticipated.

C. Assistance

If, during marking, any marking issue arises that cannot be resolved locally, please call Manitoba Education, Citizenship and Youth at the earliest opportunity to advise and/or seek assistance. If required, we will connect you to an advisor. Contact person: Ken Horton at 945-2576 (1 800 282-8069, extension 2576).

SCORING GUIDELINES

Answer Key for Selected-Response Questions

Answer Key for Selected-Response Questions

Choice I	Choice II
1. C	1. C
2. A	2. A
3. B	3. B
4. A	4. A
5. D	5. D
6. C	6. C
7. B	7. B
8. A	8. A
9. D	9. D
10. C	10. C
11. D	11. D
12. D	12. D
13. D	13. D
14. A	14. A
15. A	15. A
16. B	16. B
17. B	17. B
18. D	18. D
19. B	19. B
20. A	20. A
21. B	21. B
22. C	22. C
23. B	23. B
24. C	24. C
25. A	25. D
26. B	26. A

SCORING GUIDELINES

Marking Key and *Scoring Rubrics* (including student exemplars)

Question No. 27

Specific Outcomes: A.1 and E.2 (RR/E)

♦ Question

2 marks

Miguel wrote a sequence of equations.
Here is a section of it:

$$e + 4 = 3e$$
$$f + 6 = 3f$$
$$g + 8 = 3g$$
$$h + 10 = 3h$$
$$i + 12 = 3i \ldots$$

a) Continue the sequence of equations to complete the following:

$m +$ ____ = ____

b) In the above equations, explain the **relationship between** the value of the variables and the constant terms.

♦ Answer Key

a) $m + 20 = 3m$
$m = 10$

Sample answers (other answers possible):

b) The constant term is twice as big as the value of the variable.

OR

As the constant increases by 2 the value of the variable increases by 1

Marking Key

2 marks:
- 1 mark for correct equation in a)
- 1 mark for correct explanation in b)

Marker note(s):
- *do not accept "alphabet increase" in b); the answer must show relationship **between** the variable and the constant*

Question No. 28

Specific Outcome: J.4 (RR)

♦ Question

3 marks

Gary is trying to give an idea of the winter temperatures in Manitoba to his friend in Southern California. In order to convert the temperatures from Celsius (C) to Fahrenheit (F), he uses the following formula:

$$F = 1.8C + 32$$

a) Calculate the temperature in Fahrenheit (F) if $C = -30°$Celsius.

b)
- Using the equation above, what is the equivalent of $5°F$ in Celsius (C)?
- Show your work.

♦ Answer Key

a) If $C = -30°$

$$F = 1.8(-30°) + 32$$

$$F = -22°$$

b) If $F = 5$,

$$5 = 1.8C + 32$$

$$5 - 32 = 1.8C$$

$$-27 = 1.8C$$

$$-15° = C$$

Marking Key

3 marks:

- 1 mark for correct answer in a)
- 1 mark for correct answer in b)
- 1 mark for work in b) with correct substitution and formula

Marker note(s):

- *no mark deducted if the student has not indicated the symbol for degree*

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Question No. 29

Specific Outcomes: B.1, B.3, B.4, B.5 and B.6 (OR)

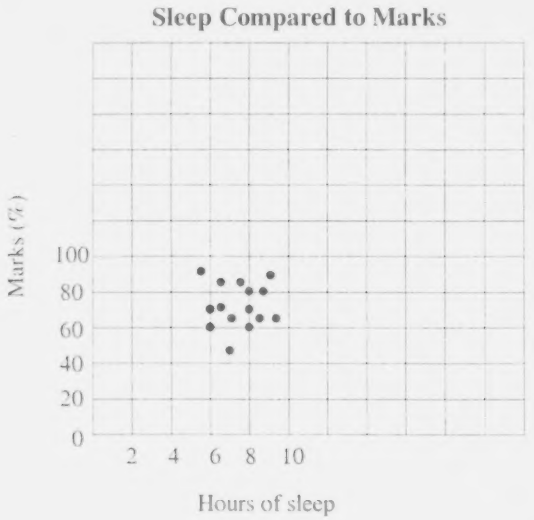
QUESTION AND ANSWER KEY

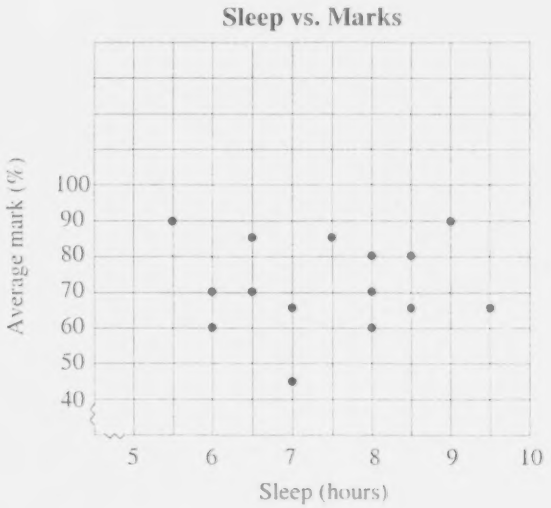
29. **OPEN-RESPONSE QUESTION** | 6 marks |

A researcher wants to know if there is a relationship (or correlation) between how much time Canadian students sleep and how well they do in school. She collects the following data from a total of 15 boys and girls in a Manitoba Senior 1 classroom.

a) Make a scatterplot using the data. Include a title, labels and scales.

Sample answers:





b) According to the data, what relationship (correlation) exists between the two variables?

- There is not a strong relationship between sleep time and marks or slight positive correlation.
- There is no clear pattern or trend in the graph.

Sample response: (other responses are possible)

c)
- **State one possible bias in this study.**
- **Explain how the researcher could have avoided this bias.**

- only 15 students → increase sample size
- just Manitoba → random sampling in every province and territory
- just S1 students → random sampling across grades
- just one night → record 1 week's data and take average

Scoring Rubric

	Score and General Performance Indicators	Specific Performance Indicators/Criteria
Level 1 limited understanding	**1** **weak attempt**	- any 1 criterion met
	2 **reasonable strategy, minor errors and/or omissions**	- any 2 criteria met
Level 2 good understanding	**3** **reasonable strategy, minor errors and/or omissions**	- any 3 criteria met
	4 **sound strategy, mostly complete, minor errors**	- any 4 criteria met
	5 **response complete with one minor error or omission**	- any 5 criteria met
Level 3 exceptional understanding	**6** **response complete, correct, showing insightful thinking, critical thinking, or a generalization**	- all 6 criteria met

Criteria:

1. *scatterplot title, x-axis labelled with sleep (hours), y-axis labelled with average mark (%)*
2. *correct scales on both axes according to axes labels*
3. *at least 13 points plotted correctly*
4. *reasonable relationship (correlation) in b) based on their scatterplot*
5. *reasonable bias in c)*
6. *reasonable explanation to avoid bias stated in c)*

Marker note(s):

- *no deduction in criteria 1 for one unit missing*
- *no deduction for missing truncation in the graph*
- *if placement of independent and dependent variables is incorrect, do not award criterion 1—remaining criteria may still be awarded*

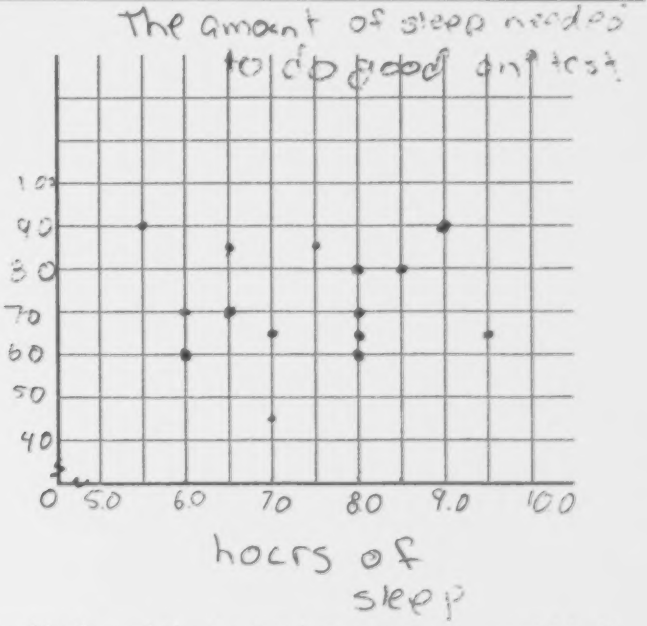
EXEMPLARS

29. **OPEN-RESPONSE QUESTION**

A researcher wants to know if there is a relationship (or correlation) between how much time Canadian students sleep and how well they do in school. She collects the following data from a total of 15 boys and girls in a Manitoba Senior 1 classroom.

hours of sleep	6.0	6.5	8.0	9.0	8.5	8.0	9.5	8.5	8.0	7.0	6.5	7.5	5.5	7.0	6.0
average mark, %	60	85	70	90	65	60	65	80	80	65	70	85	90	45	70

a) Make a scatterplot using the data. Include the title, labels and scales.



b) According to the data, what relationship (correlation) exists between the two variables?

that no metter how much sleep you get it does not affect your mark.

c)
- State one bias in this study.
- Explain how the researcher could have avoided this bias.

1) not enough students, scrvegy more students from different schools
2) if they studyed, make sure they studyed or not.

5 marks
- criteria 1, 2, 3, 4 and 5 met

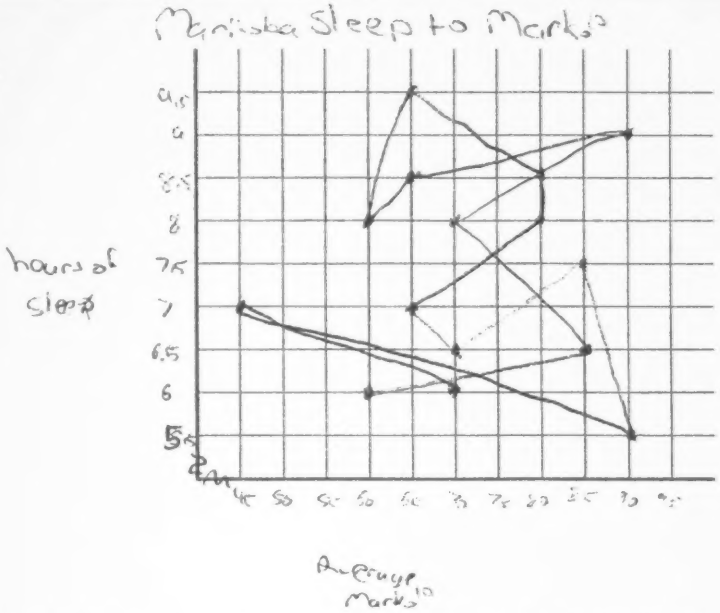
6 marks

29. **OPEN-RESPONSE QUESTION**

A researcher wants to know if there is a relationship (or correlation) between how much time Canadian students sleep and how well they do in school. She collects the following data from a total of 15 boys and girls in a Manitoba Senior 1 classroom.

hours of sleep	6.0	6.5	8.0	9.0	8.5	8.0	9.5	8.5	8.0	7.0	6.5	7.5	5.5	7.0	6.0
average mark, %	60	85	70	90	65	60	65	80	80	65	70	85	90	45	70

a) Make a scatterplot using the data. Include the title, labels and scales.



b) According to the data, what relationship (correlation) exists between the two variables?

None there all different
it goes every where.

c)
- State one bias in this study.
- Explain how the researcher could have avoided this bias.

your only using one grade level and only
15 people out of millions.
go to different schools
- use more people
- use more than one grade.

4 marks
- criteria 2, 3, 5 and 6 met

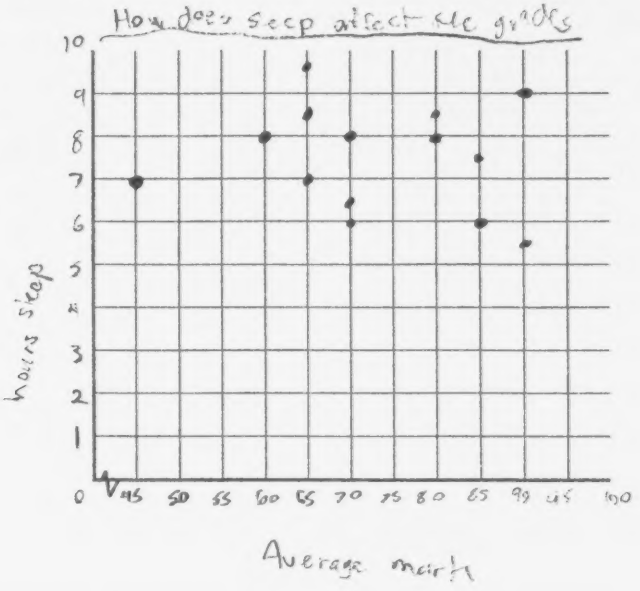
6 marks

29. **OPEN-RESPONSE QUESTION**

A researcher wants to know if there is a relationship (or correlation) between how much time Canadian students sleep and how well they do in school. She collects the following data from a total of 15 boys and girls in a Manitoba Senior 1 classroom.

hours of sleep	6.0	6.5	8.0	9.0	8.5	8.0	9.5	8.5	8.0	7.0	6.5	7.5	5.5	7.0	6.0
average mark, %	60	85	70	90	65	60	65	80	80	65	70	85	90	45	70

a) Make a scatterplot using the data. Include the title, labels and scales.



b) According to the data, what relationship (correlation) exists between the two variables?

Helps most of the students but for some it doesn't because of a couple people that don't sleep much and get good grade and some sleep average and get bad grade.

c)
- State one bias in this study.
- Explain how the researcher could have avoided this bias.

3 marks
- criteria 1, 2 and 3 met

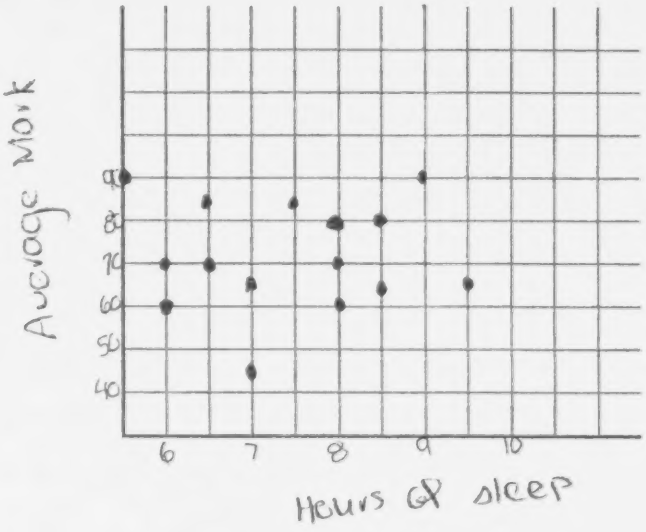
6 marks

29. **OPEN-RESPONSE QUESTION**

A researcher wants to know if there is a relationship (or correlation) between how much time Canadian students sleep and how well they do in school. She collects the following data from a total of 15 boys and girls in a Manitoba Senior 1 classroom.

hours of sleep	6.0	6.5	8.0	9.0	8.5	8.0	9.5	8.5	8.0	7.0	6.5	7.5	5.5	7.0	6.0
average mark, %	60	85	70	90	65	60	65	80	80	65	70	85	90	45	70

a) Make a scatterplot using the data. Include the title, labels and scales.



b) According to the data, what relationship (correlation) exists between the two variables?

There is a slight increase in marks in the teens who sleep longer. The kids who slept longer had the leading marks in the class

c)
- State one bias in this study.
- Explain how the researcher could have avoided this bias.

One bias would be that all the kids in the class were not attending school that day. one thing to prevent this problem would be to wait until the entire class is in that classroom.

2 marks
- criteria 2 and 3 met

6 marks

Question No. 30

Specific Outcomes: C.6, H.6, H.7 and H.2 (RR)

♦ Question

3 marks

The perimeter of the trapezoid is equal to the perimeter of the square

Perimeter = $8y + 12$

a) Write the **simplified** algebraic expression for the length of one side of the square.

b) Write the **simplified** algebraic expression for the area of the square.
- Show your work.

♦ Answer Key

a) $P_{sq} = 8y + 12$

$$l_{sq} = \frac{8y + 12}{4}$$

$= 2y + 3$ (length of one side)

b) $A_{sq} = (2y + 3)(2y + 3)$

$= 4y^2 + 6y + 6y + 9$

$= 4y^2 + 12y + 9$ (area of square)

Marking Key

3 marks:
- 1 mark for correct side length of square in a)
- 1 mark for correct area of square according to their answer in a)
- 1 mark for work shown in b) if correctly expanded

Marker note(s):
- $(2y + 3)^2$ *is a correct strategy*

Question No. 31

Specific Outcome: E.2 (RR/E)

♦ Question

3 marks

a) Solve this equation:

$$10p = 5(3p - 2)$$

- Verify your answer by substitution.

b) Jackson was asked to write an equivalent equation to the one given in a). He wrote:

$$20p = 10(6p - 4)$$

- Is Jackson's equation equivalent or not equivalent to the one in a)? Explain your thinking.

♦ Answer Key

a) $p = 2$ verification: $10(2) = 5(3(2) - 2)$

$20 = 5(4)$

$20 = 20$

b) not equivalent because Jackson's equation works out to be $p = 1$

OR

not equivalent because I substituted 2 into the new question

$20(2) = 10\left[6(2) - 4\right]$

$40 \neq 80$

OR

not equivalent because Jackson doubled the left side and multiplied the right side by 4

Marking Key

3 marks:

- 1 mark for correct answer in a)
- 1 mark for correctly verifying their answer
- 1 mark for explanation in b)

Marker note(s):

- *student may verify correctly using a wrong value for p and stop at L.S ≠ R.S.—award mark for correct verification*
- *no mark awarded for simply stating "not equivalent" in b)*

Question No. 32

Specific Outcomes: C.6, A.1 and H.6 (RR/E)

♦ Question

3 marks

You can use algebra to understand the following mathematical "trick".

a) Complete the following steps to see how the trick works.

b) How can you change step 3 so the end result will always be −4?

♦ Answer Key

a)

	Steps		Simplified Algebraic Representation		Simplified Numerical Representation
1.	Pick a starting number	=	x		5
	↓		↓		↓
2.	Double the number	=	$2x$		10
	↓		↓		↓
3.	Add 12	=	$2x + 12$		22
	↓		↓		↓
4.	Divide by 2	=	$x + 6$		11
	↓		↓		↓
5.	Subtract the starting number (step 1)	=	6 (End result)	=	6 (End result)

b) Step 3 becomes subtract 8 or add negative 8.

Marking Key

3 marks:

- 1 mark for correctly completing the algebraic chart in a)
- 1 mark for correctly completing the numerical chart in a)
- 1 mark for correct explanation in b)

Marker note(s):

- *deduct a maximum of 1 mark for not simplifying*

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Question No. 33

Specific Outcomes: E.2 and C.10 (OR)

QUESTION AND ANSWER KEY

33. **OPEN-RESPONSE QUESTION** | 4 marks |

Taxi Company A charges a flat fee of $4.00, plus $1.30 for each kilometre travelled.

a) • **Write an equation to show how much it costs to use Company A for a distance of "x" kilometres.**
• **How much will it cost to take a taxi from Company A for 10 kms?**

$C = 4 + 1.3d$

$C = 4 + 1.3(10)$

$= \$17.00$

b) **A new taxi company charges the same way (flat fee plus an amount for each kilometre) as Company A, but wants to be cheaper for trips under 10 kms and more expensive for longer trips.**
• **How can the new taxi company charge its customer? Write an equation.**
• **Justify your answer.**

Example: showing cost lower than Taxi A at 10 km or less

$C = 4 + 1.3(10)$ so must be less than $17 to go 10 km

$= \$17$

$C = 1 + 1.55(d)$

for $d = 10$ km,

$C = 1 + 15.50$

$= \$16.50$ so it is cheaper at 10 km

but more expensive for long trips because you charge more for each kilometre

Example: showing cost higher than Taxi A for distance over 10 km

$C = 4 + 1.3(14)$ $\qquad$ $C = 1 + 1.55(14)$

$C = 4 + 18.20$ $\qquad$ $C = 1 + 21.70$

$C = 22.20$ $\qquad$ $C = 22.70$

Scoring Rubric

	Score and General Performance Indicators	Specific Performance Indicators/Criteria
Level 1 limited understanding	**1 weak attempt**	- any 1 criterion met
Level 2 good understanding	**2 reasonable strategy, minor errors and/or omissions**	- any 2 criteria met
	3 response complete with one minor error or omission	- any 3 criteria met
Level 3 exceptional understanding	**4 response complete, correct, showing insightful thinking, critical thinking, or a generalization**	- all 4 criteria met

Criteria:

1. *correct equation in a)*
2. *correct answer to their equation in a)*
3. *decreases the flat fee and increases the price/km in a single equation*
4. *justifies (must show both cases)*

Marker note(s):

- *accept an algebraic expression in a) or in b)*
- *justification in b) must include verification for a trip being cheaper for distances under 10 km and more expensive for a longer trip. "Longer trip" means that at some distance the cost in b) must be more expensive than the cost in a).*
- *if more than 1 equation is given in b), award a maximum of 3 marks*

EXEMPLARS

33. **OPEN-RESPONSE QUESTION**

Taxi Company A charges a flat fee of $4.00, plus $1.30 for each kilometre travelled.

a)
- Write an equation to show how much it costs to use Company A for a distance of "x" kilometres.
- How much will it cost to take a taxi from Company A for 10 kms?

Company A = 4 + 1.3x Kilometres

Company A = 4 + 1.3 x 12 = $19.60

b) A new taxi company charges the same way (flat fee plus an amount for each kilometre) as Company A, but wants to be cheaper for trips under 10 kms and more expensive for longer trips.
- How can the new taxi company charge its customer? Write an equation.
- Justify your answer.

Company B = 3 + 1.2 x kilometres

Company B = 4 + 1.2 x 10 = 16

Company B can lower its flat fee and amount per KMs

1 mark
• criteria 1 met

4 marks

33. **OPEN-RESPONSE QUESTION**

Taxi Company A charges a flat fee of $4.00, plus $1.30 for each kilometre travelled.

a)
- Write an equation to show how much it costs to use Company A for a distance of "x" kilometres.
- How much will it cost to take a taxi from Company A for 10 kms?

$4+1.30k$

$4+1.30(12)$

$\$19.60$

b) A new taxi company charges the same way (flat fee plus an amount for each kilometre) as Company A, but wants to be cheaper for trips under 10 kms and more expensive for longer trips.
- How can the new taxi company charge its customer? Write an equation.
- Justify your answer.

$4+1(10+3.50)$

If they charge $1 for trips under 10 km then $3.50 for more.

2 marks
- criteria 1 and 2 met

4 marks

Question No. 34

Specific Outcome: F.2 (RR/E)

♦ Question

3 marks

From point X, the angles of elevation to the top of the two buildings are shown in the diagram. Point X is 20 metres from the short building.

a) Use trigonometry, to determine the height of the shorter building.

b) State why these two triangles are **similar**.

c) Explain how to use **similar triangles** to calculate the height of the taller building.

♦ Answer Key

a) $\tan 60° = \frac{h}{20}$

$h = 20 \times \tan 60°$

$h = 34.64$ m (34.6, 35)

b) – angle angle (A.A; A.A.S.P.; A.A.A.—"same shape")
– two pairs of congruent or equal angles
– student writes a scale and shows proportionate sides

c) Sample response :

measure the distance (d) from X to the tall building

$\frac{20}{h_{\text{small}}} = \frac{d}{h_{\text{large}}}$

or reasonable explanation in words

Marking Key

3 marks:

- 1 mark for correct answer in a)
- 1 mark for correct answer in b)
- 1 mark for correct explanation in c)

Question No. 35

Specific Outcomes: G.3 and A.1 (RR/E)

♦ Question

3 marks

Jill has twelve candies in a bag: 5 red, 4 yellow, 3 green.

a) She randomly picks 2 candies. She records the colour of the first candy and then returns it to the bag before picking a second candy.
   - What is the probability that both candies are green?
   - Show your work.

b) What is the minimum number of candies Jill has to pick out and **eat** before being sure of picking a red one? Explain your reasoning.

♦ Answer Key

a) $\frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$ or $\frac{3}{12} \times \frac{3}{12} = \frac{9}{144}$

b) 7
She will be sure to pick a red one by the eighth pick. The first seven picks could all be green or yellow candies.

OR

She needs to pick out 8 to be sure she picks one red candy (or 8^{th} pick).

OR

Shows 4 yellow and 3 green then next one must be red.

Marking Key

3 marks:
- 1 mark for correct strategy in a)
- 1 mark for correct answer in a)
- 1 mark for correct explanation in b)

Marker note(s):
- *no mark awarded in b) if only one number is stated*

Question No. 36

Specific Outcome: H.3 (OR)

QUESTION AND ANSWER KEY

36. **OPEN-RESPONSE QUESTION** 4 marks

Using 4 different exponent laws, create 4 expressions that are equivalent to x^6.

Expression 1	Expression 2	Expression 3	Expression 4

Sample responses:

$x^3 \times x^3$ $\quad \frac{x^8}{x^2}$ $\quad (x^2)^3$ $\quad 5^0 \times x^6$

Scoring Rubric

	Score and General Performance Indicators	Specific Performance Indicators/Criteria
Level 1 limited understanding	**1** **weak attempt**	- any 1 criterion met
Level 2 good understanding	**2** **reasonable strategy, minor errors and/or omissions**	- any 2 criteria met
	3 **response complete with one minor error or omission**	- any 3 criteria met
Level 3 exceptional understanding	**4** **response complete, correct, showing insightful thinking, critical thinking, or a generalization**	- all 4 criteria met

Criteria:

1. *a correct expression*
2. *a second correct expression applying a different exponent law*
3. *a third correct expression applying a different exponent law*
4. *a fourth correct expression applying a different exponent law or a combination of any two (or more) exponent laws*

Marker note(s):

- *exponent laws*

$x^m \times x^n = x^{m+n}$

$x^m \div x^n = x^{m-n}$

$(x^m)^n = x^{mn}$

$(xy)^m = x^m y^n$

$\left(\frac{x}{y}\right)^n = \frac{x^n}{y^n}$

$x^0 = 1$

$x^{-n} = \frac{1}{x^n}$, $x \neq 0$ may be used

EXEMPLARS

36. **OPEN-RESPONSE QUESTION**

Using 4 **different** exponent laws, create 4 expressions that are equivalent to x^6.

Expression 1	Expression 2	Expression 3	Expression 4
$\frac{(x^2)^3}{(x)^2}$	$\frac{(x^3)^2}{(x)^2}$	$\frac{(x)^6}{(x)(x)}$	$(x)^4$

3 marks
- criteria 1, 3 and 4 met

4 marks

36. **OPEN-RESPONSE QUESTION**

Using 4 **different** exponent laws, create 4 expressions that are equivalent to x^6.

Expression 1	Expression 2	Expression 3	Expression 4
$\frac{(x^3)^2}{(x)^2}$	$\frac{x^2 \cdot x^4}{x \cdot x}$	$\frac{(x)^{10} \div (x)^4}{x^2}$	

2 marks
- criteria 1 and 4 met

4 marks

Question No. 37

Specific Outcome: H.12 (RR)

♦ **Question** 2 marks

a) Anita got this answer to a problem:

$$75.04 \times 10^6$$

Write the answer in scientific notation.

b) Write the following expression in scientific notation.

$$\frac{\left(6.5 \times 10^{-5}\right) \times \left(3.9 \times 10^4\right)}{2.3 \times 10^5}$$

♦ **Answer Key**

a) 7.504×10^7 ***OR*** 7.5×10^7

b) $\dfrac{\left(6.5 \times 10^{-5}\right) \times \left(3.9 \times 10^4\right)}{2.3 \times 10^5}$

$= 1.1 \times 10^{-5}$

Marking Key

2 marks:

- 1 mark for correct answer in a)
- 1 mark for correct answer in b)

Question No. 38

Specific Outcomes: I.4 and I.2 (RR)

♦ Question

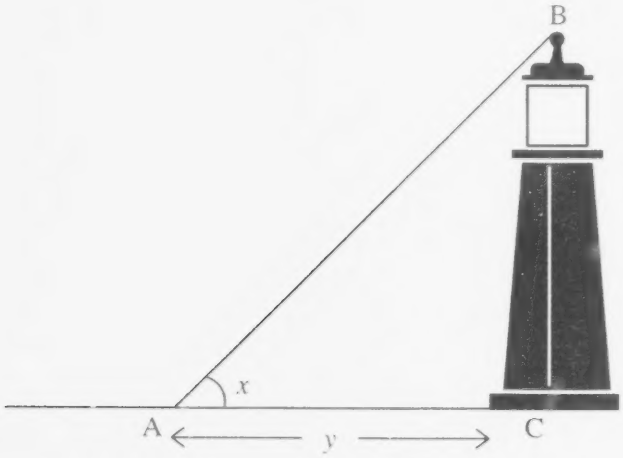
2 marks

Chris needs to measure the height of a lighthouse, and there is no way to get to the top of it. Chris decides to use trigonometry.

a) State or show what measurements Chris needs to make in order to use trigonometry to calculate the height of the lighthouse.

b) Which trigonometric ratio should Chris use to calculate the height of the lighthouse?

♦ Answer Key



a) Chris needs to measure the angle x (where he is standing) and the distance y (length of one side).

b) $\tan x = \dfrac{\text{opp}}{\text{adj}} = \dfrac{\text{height of tower}}{\text{distance from base}}$

Marking Key

2 marks:

- 1 mark for reasonable method to find measurements in a)
- 1 mark for correct equation in b)

Marker note(s):

- *student may show x and y as values (protractor and ruler used) rather than variables*

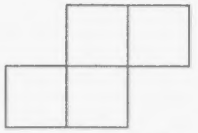
Question No. 39—Choice I only

Specific Outcome: D.2 (OR)

QUESTION AND ANSWER KEY

39. **OPEN-RESPONSE QUESTION** | 4 marks |

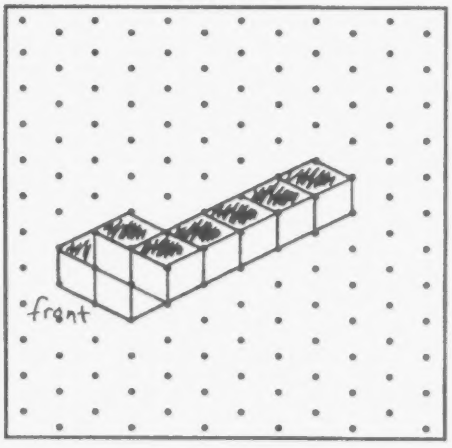
a) • **Draw two different 3-dimensional models that contain 8 cubes and that have the front elevation shown.**
• **Label the front of each model.**
• **Shade the top.**



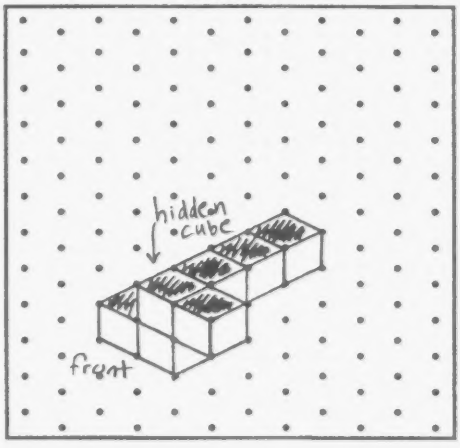
Front Elevation

Possible answers:

Sketch A

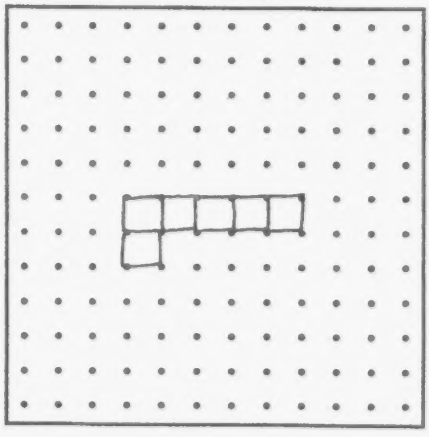


Sketch B

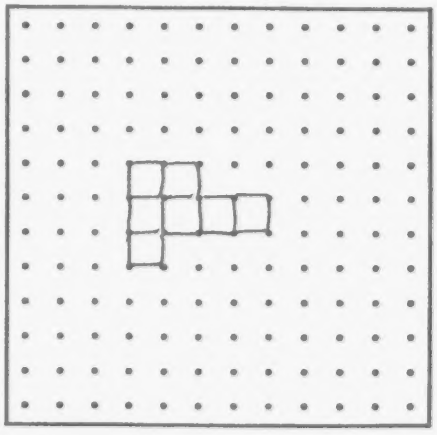


b) **Draw the right view for Sketch A and the top view for Sketch B.**

Sketch A – Right view



Sketch B – Top view



Scoring Rubric

	Score and General Performance Indicators	Specific Performance Indicators/Criteria
Level 1 limited understanding	**1 weak attempt**	- any 1 criterion met
Level 2 good understanding	**2 reasonable strategy, minor errors and/or omissions**	- any 2 criteria met
	3 response complete with one minor error or omission	- any 3 criteria met
Level 3 exceptional understanding	**4 response complete, correct, showing insightful thinking, critical thinking, or a generalization**	- all 4 criteria met

Criteria:

1. *correct diagram in a) (Sketch A)*
2. *correct different diagram in a) (Sketch B)*
3. *correct right view of Sketch A*
4. *correct top view of Sketch B with correct orientation*

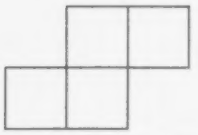
Marker note(s):

- *award a maximum of 1 mark for a) if same minor error made in both diagrams (e.g., 1 misplaced or missing cube)*
- *assume that the front of the top view is at the bottom of the sketch unless it is labelled otherwise*
- *hidden cubes can be assumed*
- *other responses are possible*

EXEMPLARS

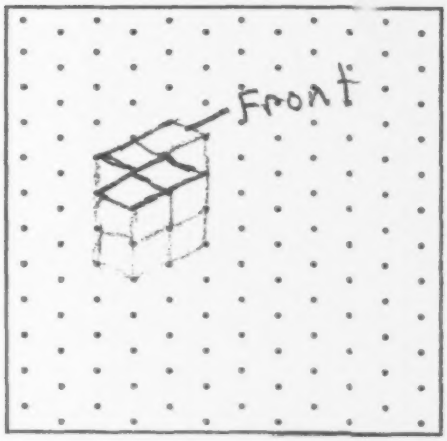
39. **OPEN-RESPONSE QUESTION**

a)
- Draw two different 3-dimensional models that contain 8 cubes and that have the front elevation shown.
- Label the front of each model.
- Shade the top.

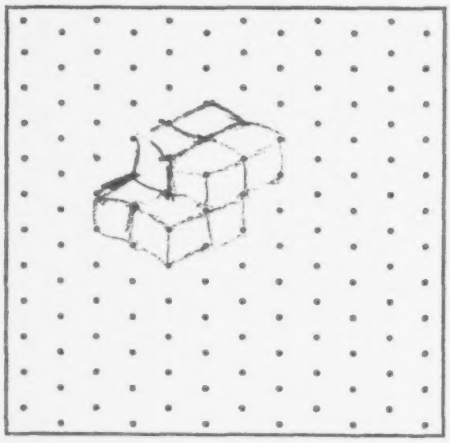


Front Elevation

Sketch A

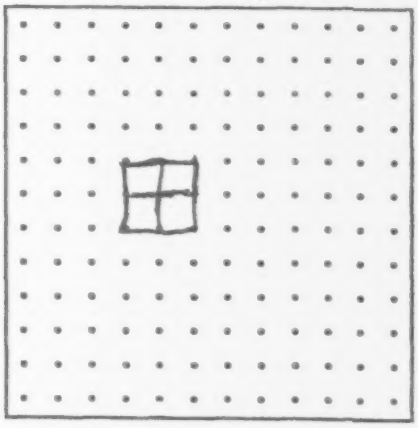


Sketch B

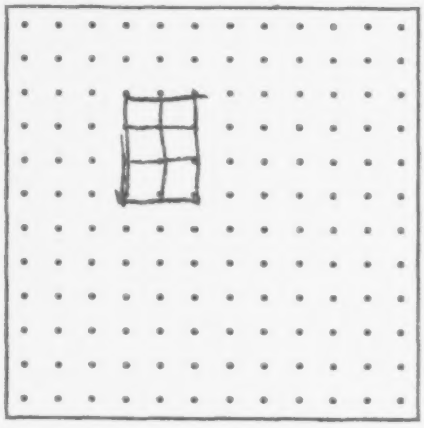


b) Draw the right view for Sketch A and the top view for Sketch B.

Sketch A – Right view



Sketch B – Top view

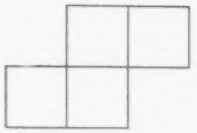


2 marks
- criteria 2 and 4 met

4 marks

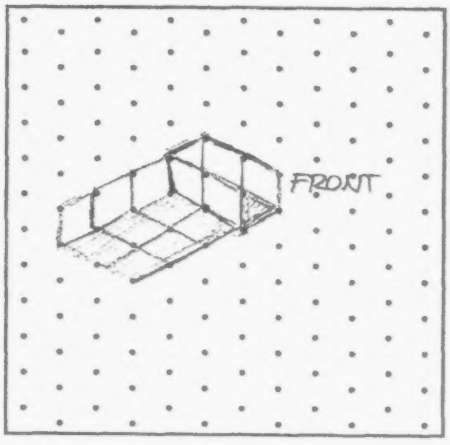
39. **OPEN-RESPONSE QUESTION**

a)
- Draw two different 3-dimensional models that contain 8 cubes and that have the front elevation shown.
- Label the front of each model.
- Shade the top.

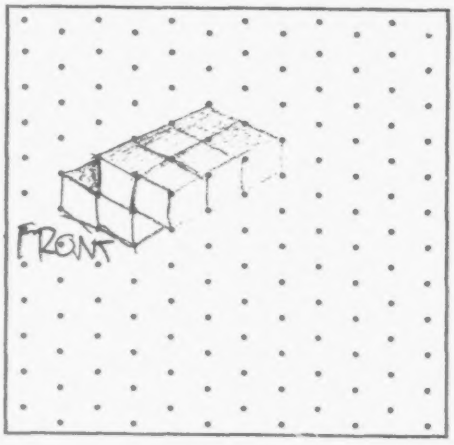


Front Elevation

Sketch A

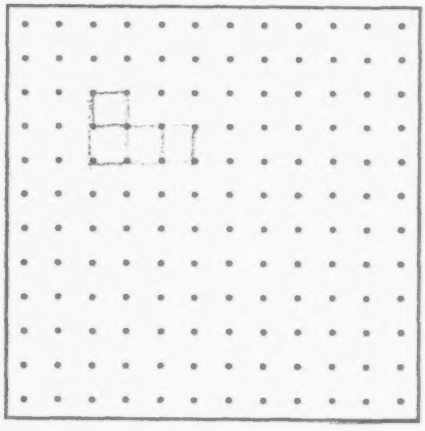


Sketch B

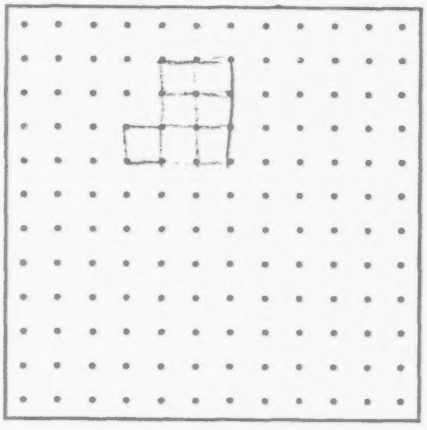


b) Draw the right view for Sketch A and the top view for Sketch B.

Sketch A – Right view



Sketch B – Top view

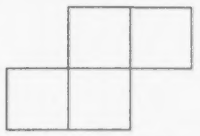


2 marks
• criteria 1 and 3 met

4 marks

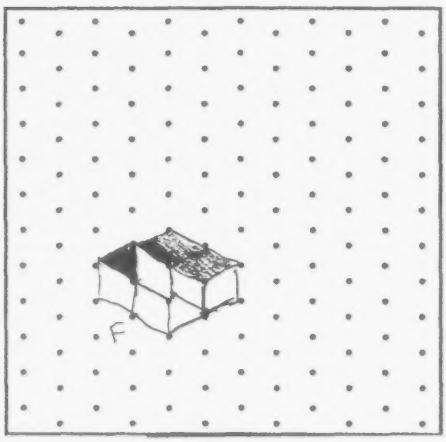
39. **OPEN-RESPONSE QUESTION**

a) • Draw two different 3-dimensional models that contain 8 cubes and that have the front elevation shown.
• Label the front of each model.
• Shade the top.

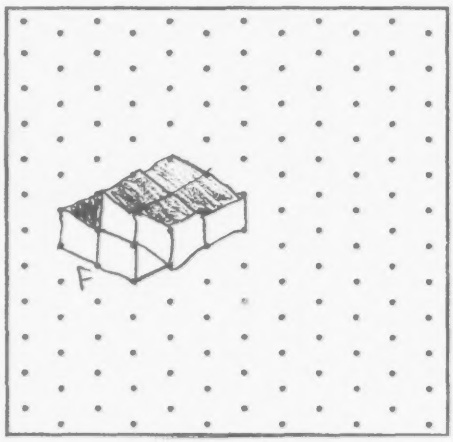


Front Elevation

Sketch A

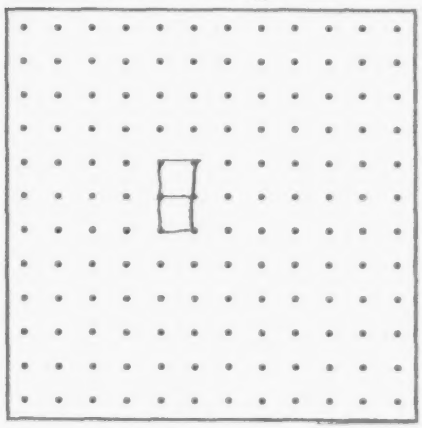


Sketch B

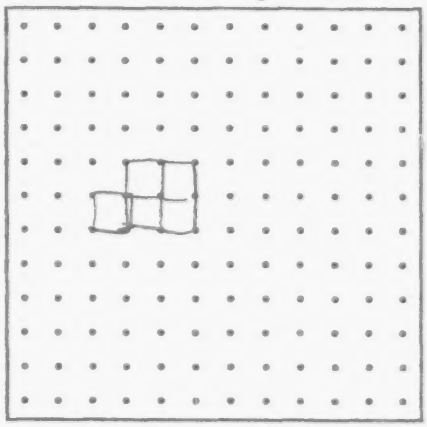


b) Draw the right view for Sketch A and the top view for Sketch B.

Sketch A – Right view



Sketch B – Top view



1 mark
• criteria 2 met

4 marks

Question No. 40—Choice I only

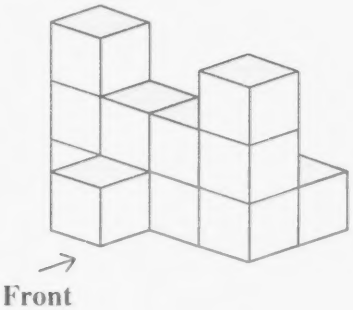
Specific Outcome: D.3 (RR)

♦ Question

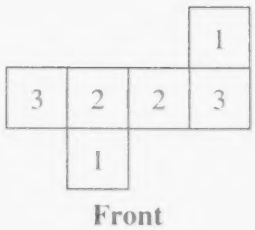
2 marks

Twelve cubes were used to build this object.

- Sketch the **base plan** for the object shown.
- Include the **number of cubes** in each column.



♦ Answer Key



Marking Key

2 marks:

- 1 mark for correct base plan shape
- 1 mark for correct number of cubes in each column

Marker note(s):

- *any orientation is acceptable*

Question No. 39—Choice II only

Specific Outcome: K.1 (RR)

♦ Question

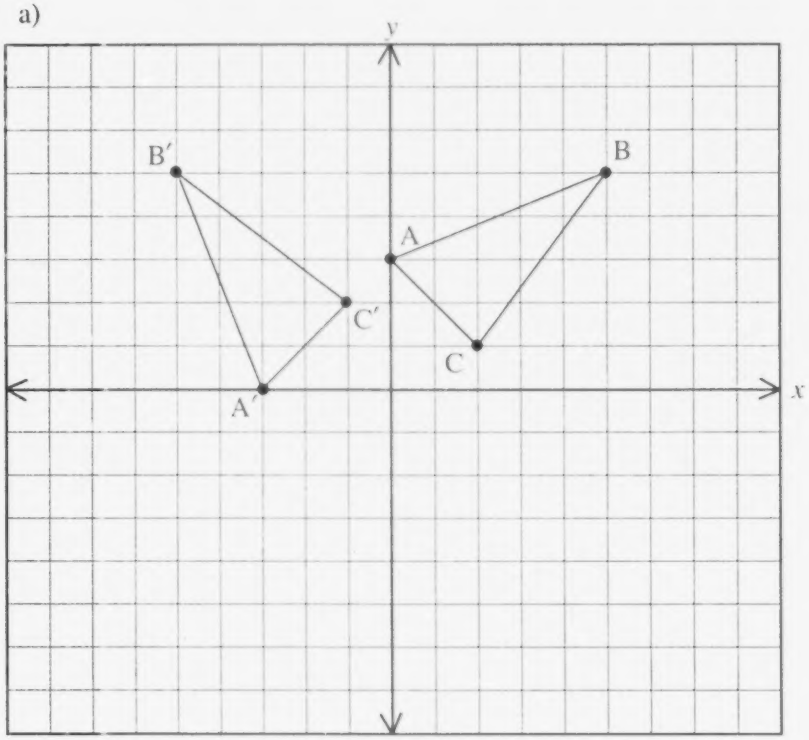
2 marks

a) • Rotate ΔABC about the origin, 90° **counter-clockwise**, and draw its image.

b) State the coordinates of the vertices of $\Delta A'B'C'$.

♦ Answer Key

a)



b) $A'(-3, 0)$ $B'(-5, 5)$ $C'(-1, 2)$

Marking Key

2 marks:

- 1 mark for correct image in a)
- 1 mark for correct coordinates in b) according to image drawn in a)

Marker note(s):

- *if image has no labels* $(A'B'C')$, *this is a trivial error (no deduction)*
- *if student rotates clockwise, the coordinates are* $A'(3, 0)$ $B'(5, -5)$ $C'(1, -2)$

Question No. 40—Choice II only

Specific Outcome: K.4 (OR)

QUESTION AND ANSWER KEY

40. **OPEN-RESPONSE QUESTION** | 4 marks |

A figure and its dilatation image are always similar.

a) What relationship exists between the corresponding sides of similar figures?

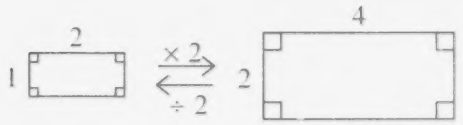
They have the same ratios or scale factor or the same fraction or they are proportional.

b) What relationship exists between the corresponding angles in similar figures?

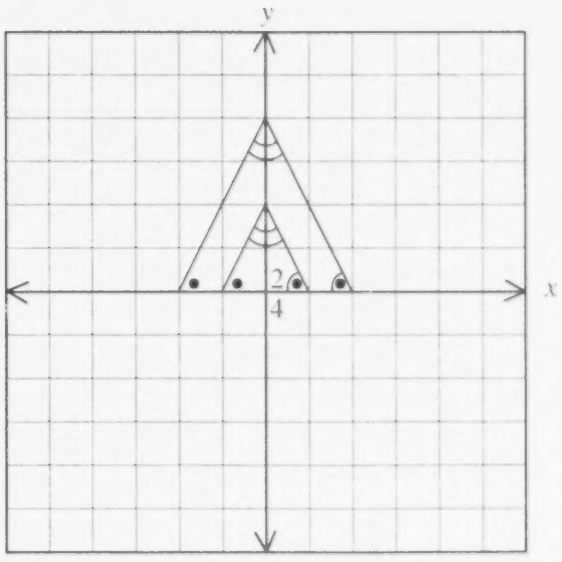
They are congruent.

Sample responses:

c) Draw and label the dimensions (sides or angles) of a figure and its dilatation to support your answer in a) or b).



OR



Scoring Rubric

	Score and General Performance Indicators	Specific Performance Indicators/Criteria
Level 1 limited understanding	**1 weak attempt**	- any 1 criterion met
Level 2 good understanding	**2 reasonable strategy, minor errors and/or omissions**	- any 2 criteria met
	3 response complete with one minor error or omission	- any 3 criteria met
Level 3 exceptional understanding	**4 response complete, correct, showing insightful thinking, critical thinking, or a generalization**	- all 4 criteria met

Criteria:

1. correct answer in a)
2. correct answer in b)
3. sketch of similar figures in c)
4. dimensions labelled supporting answers in a) in b)

Marker note(s):

- for criteria 4, check to see that labels are sufficient to prove similar figures

EXEMPLAR

40. **OPEN-RESPONSE QUESTION**

A figure and its dilatation image are always similar.

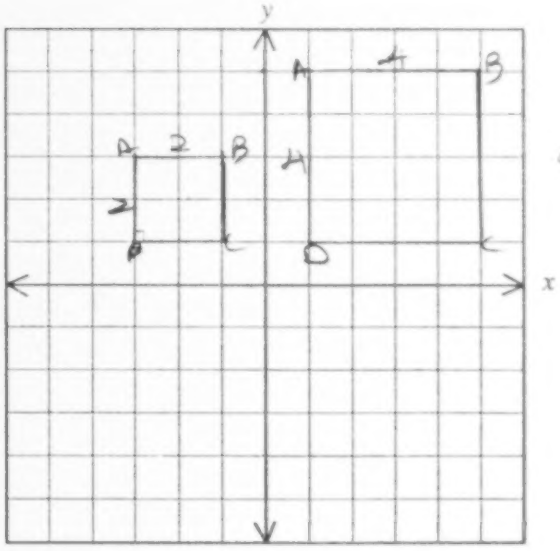
a) What relationship exists between the corresponding sides of similar figures?

The sides are similar eg. dilate by $\frac{1}{2}$ x
$4 \times \frac{1}{2} = 2$

b) What relationship exists between the corresponding angles in similar figures?

The angles remain the same, the don't change

c) Draw and label the dimensions (sides or angles) of a figure and its dilatation to support your answer in a) or b).



← Dilate by $\frac{1}{2}$

Nothing changes except the side, the angles remain the same and the sides are similar.

4 marks
- criteria 1, 2, 3 and 4 met

4 marks

40. **OPEN-RESPONSE QUESTION**

A figure and its dilatation image are always similar.

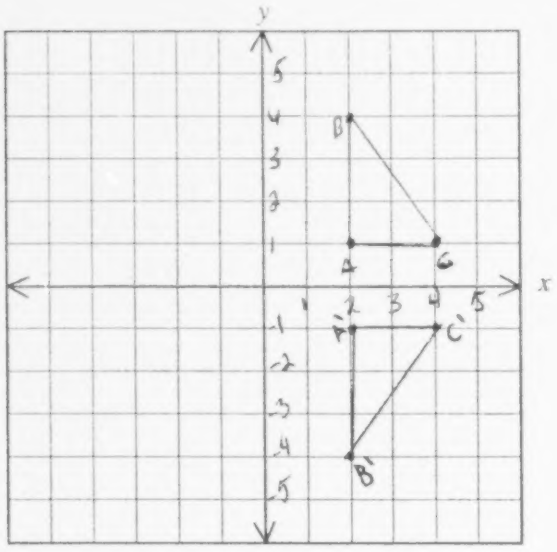
a) What relationship exists between the corresponding sides of similar figures?

All the sides are usually smaller or bigger but the same scale

b) What relationship exists between the corresponding angles in similar figures?

All the angles are the same

c) Draw and label the dimensions (sides or angles) of a figure and its dilatation to support your answer in a) or b).



3 marks
- criteria 1, 2 and 3 met

4 marks

APPENDICES

Appendix A

SPECIFIC OUTCOME MATCH

Selected-Response Questions		
Question No.	**Unit(s)**	**Specific Outcome(s)**
1	A	1
2	A	1
3	A	1
4	A	1
5	B	2
6	B	4
7	B	6
8	C	4
9	C	8
10	C	9
11	E	2
12	E/J	2/4
13	G	3
14	G	3
15	H	1
16	H	2
17	H	6
18	H	7
19	H	10
20	H	11
21	H	13
22	I	1
23	F	2
24	I	3
Choice I		
25	D	2
26	D	1
Choice II		
25	K	1
26	K	3

Restricted-Response Questions			
Question No.	**Unit(s)**	**Specific Outcome(s)**	**Mark Value**
28	J	4	3
30	C/H	6/6, 7, 2	3
37	H	12	2
38	I	4, 2	2
Choice I			
40	D	3	2
Choice II			
39	K	1	2

Restricted-Response with Explanation Questions			
Question No.	**Unit(s)**	**Specific Outcome(s)**	**Mark Value**
27	A, E	1, 2	2
31	E	2	3
32	C/A/H	6/1/6	3
34	F	2	3
35	G/A	3/1	3

Open-Response Questions			
Question No.	**Unit(s)**	**Specific Outcome(s)**	**Mark Value**
29	B	1, 3, 4, 5, 6	6
33	E/C	2/10	4
36	H	3	4
Choice I			
39	D	2	4
Choice II			
40	K	4	4

Appendix B

DOUBLE MARKING RECORD SHEET

FIRST MARKING BOOKLET NO.

_____

Marker ID	Question	Score
	Total	

DOUBLE MARKING RECORD SHEET

SECOND MARKING BOOKLET NO.

_____

Marker ID	Question	Score
	Total	

Appendix C

GENERATING STUDENT PROFILES—CHOICE I

Profile of Test Score by Question Type

Question Type	Test Questions	Total	÷ Maximum	× 100	= %
Selected Response	1 to 26: __		26		
Restricted Response	28 __, 30 __, 37 __, 38 __, 40 __		12		
Restricted Response with Explanation	27 __, 31 __, 32 __, 34 __, 35 __		14		
Open Response	29 __, 33 __, 36 __, 39 __		18		
Example					
Open Response	29 4, 33 2, 36 2, 39 1	9	18	0.5	50%

Profile of Test Score by Curricular Strand

Strand	Test Questions	Total	÷ Maximum	× 100	= %
Shape and Space	22 to 26 __, 28 __, 34 __, 38 __, 39 __, 40 __		19		
Number	8 to 12 __, 15 to 21 __, 30 __, 31 __, 32 __, 33 __, 36 __, 37 __, 39 __		31		
Statistics and Probability	5 __, 6 __, 7 __, 13 __, 14 __, 29 __, 35 __		14		
Patterns and Relations	1 __, 2 __, 3 __, 4 __, 27 __		6		

Appendix D

GENERATING STUDENT PROFILES—CHOICE II

Profile of Test Score by Question Type

Question Type	Test Questions	Total	÷ Maximum	× 100	= %
Selected Response	1 to 26: __		26		
Restricted Response	28 __, 30 __, 37 __, 38 __, 39 __		12		
Restricted Response with Explanation	27 __, 31 __, 32 __, 34 __, 35 __		14		
Open Response	29 __, 33 __, 36 __, 40 __		18		
Example					
Open Response	29 4, 33 2, 36 2, 40 1	9	18	0.5	50%

Profile of Test Score by Curricular Strand

Strand	Test Questions	Total	÷ Maximum	× 100	= %
Shape and Space	22 to 26 __, 28 __, 34 __, 38 __, 39 __, 40 __		19		
Number	8 to 12 __, 15 to 21 __, 30 __, 31 __, 32 __, 33 __, 36 __, 37 __, 39 __		31		
Statistics and Probability	5 __, 6 __, 7 __, 13 __, 14 __, 29 __, 35 __		14		
Patterns and Relations	1 __, 2 __, 3 __, 4 __, 27 __		6		